

***Request for Sites to Host
Innovative
Technology Demonstrations/Evaluations for
Hazardous Waste Cleanup***

Issue Date: October 30, 1998

Due Date/Time: January 6, 1999, 5:00 EST

Attached is the Host Site Application (HSA) for the Superfund Innovative Technology Evaluation (SITE) Demonstration Program. To be considered for the SITE Demonstration Program, respondents must submit an original application and ten (10) copies by the due date to:

**Randy A. Parker
SITE Demonstration Program (MS-481)
U.S. Environmental Protection Agency
26 West M.L. King Dr.
Cincinnati, OH 45268**

Questions regarding this HSA should be directed to:

**Vince Gallardo (513)569-7176 or
Randy A. Parker (513)569-7271
at the above address**

NOTE: EPA will not accept applications containing confidential business information (CBI). Applications received containing CBI will be returned to the applicant without review.

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Host SITE Solicitation 003

Introduction

The U.S. Environmental Protection Agency (EPA) is engaged in an effort to demonstrate and verify the cost and performance of new environmental clean-up technologies. The Superfund Innovative Technology Evaluation (SITE) Program offers a mechanism for conducting joint technology demonstration/evaluation projects between the private sector, EPA and other Federal and state agencies.

This solicitation focuses on parties responsible for hazardous waste site cleanup and their technology needs.

The purpose of the SITE Program is to demonstrate and verify field application of innovative remediation technologies on actual hazardous waste. The results of the evaluations provide reliable engineering, performance and cost information for clean-up decision makers and technology vendors.

Solicitation Objectives

The purpose of this Host Site Application (HSA) is to solicit hazardous waste sites that are available to host full-scale demonstrations of innovative, alternative treatment technologies. Through this program, sites can assess **one or more** innovative technologies under controlled conditions for the purpose of planning and evaluating remedial options.

This solicitation should be of interest to private firms, and federal and state agencies that have regulatory or financial responsibility for on-site hazardous waste remediation.

Solicitation Structure

This HSA consists of three (3) sections:

Section 1: Abstract of program requirements and areas of interest

for this solicitation.

Section 2: Application requirements and a description of the criteria used to evaluate applications.

Section 3: Cover Page and Site Fact Sheet that are to be filled out by the applicant for return with the Application.

Attachment A outlines roles and responsibilities of EPA, the technology developer, and site representatives. It also includes a schedule for a typical demonstration.

Attachment B includes a sample application. (Not available electronically)

SECTION 1. PROGRAM REQUIREMENTS AND AREAS OF INTEREST.

PROGRAM REQUIREMENTS

The host site must be able to provide or leverage funding to bear the cost of preparing the site for the technology demonstrations. Site preparation activities include providing power, site access, and physical support for the process (paving, concrete pad, containment, etc.) Proper disposal of waste generated during the demonstration is also the responsibility of the site applicant. Experience has shown that technology vendors may need assistance from the host site to cover expenses incurred during the demonstration.

EPA provides support for specific tasks in the demonstration including test plan preparation, rigorous sampling and analysis, and report writing.

Funds are not exchanged between EPA and site representatives. Prior to the demonstration, a no-funds agreement is signed by the site representative(s) and EPA to define the areas of responsibility.

The application developed in response to this HSA will be the basis for the agreement with EPA and must, therefore, contain sufficient details about the proposed site and the actual contaminants involved.

SITES OF PRIMARY INTEREST

The selection of sites for the SITE Program will be based on the needs of EPA, other Federal agencies and the user community.

The SITE Program maintains an ongoing dialogue with the user community, EPA Regional Project Managers, Superfund Technical Liaisons, State Environmental Agencies, and other Federal Agencies. This assures that the program addresses the needs of personnel who are directly involved with site remediation.

The SITE Program has an interest in receiving responses from any site that has a specific site problem that requires clean-up. **The SITE Program has particular interest in evaluating in-situ and lower cost technologies.** High priority areas of interest are listed below:

1. **Groundwater containing:**

- Contaminant plumes with both hazardous organic and inorganic compounds
- DNAPL, especially in fractured bedrock or karst environments
- PCBs or other chlorinated aromatics
- Creosote
- Phenols

2. **Soils containing:**

- Metals
- Pesticides
- Chlorinated Compounds
- Aromatics
- Creosote
- Phenols

3. **Sediments containing:**

- Pesticides
- Chlorinated Compounds
- Aromatics
- Metals

4. **Other Areas:**

Containment-

- Alternative Caps
- Walls/Bottoms
- New Materials/Delivery Systems

In-Situ-

- New Materials/Processes
- Evapotranspiration Covers

Technologies such as data management systems, thermal

destruction systems, and solidification are of lower priority to the program.

SECTION 2. APPLICATION REQUIREMENTS AND EVALUATION CRITERIA

GENERAL

Each site must submit an application to be considered for acceptance into the SITE Program. EPA may select more than one applicant. Each site may choose to evaluate multiple technologies. The application should follow the "Outline of Evaluation Criteria" shown later in this section. The general descriptions of evaluation criteria in this outline are provided to assist the applicant in addressing the criteria; they do not represent comprehensive discussions of each element.

There are 2 parts to this solicitation; Part A should be filled out by all applicants. Part B should only be completed by those applicants who are proposing technologies for evaluation.

The number of pages presented in Part A of the proposal **should not exceed twenty (20)**, including charts, tables, diagrams, and drawings. Previously acquired data is particularly encouraged as part of the application and reports or papers covering the offered site may be appended to the proposal. Company literature, resumes, and references may also be attached as appendices, but all appended materials will be counted toward the 20-page limit for application length. **Do not include proprietary data or confidential business information in the application.**

The number of pages presented in Part B **should not exceed five (5) pages.**

An original and ten (10) copies of the application are required. After review of all applications, EPA may request a meeting with the site representative to discuss questions or concerns raised during the review process.

REVIEW AND SELECTION PROCESS

Applications will be reviewed by a panel made up of representatives from EPA and other state and Federal agencies. Applicants will be selected on the basis of: their readiness and suitability for hosting a field-scale demonstrations; their

applicability to Superfund situations; their amenability to innovative technology remediation; and their potential for providing information addressing problems common to a large number of hazardous waste sites. Selection or rejection of a proposed site by EPA will reflect a judgement based on the material presented in the application and the needs and resources of the SITE Program. All applicants will receive a written response outlining the results of the review. The SITE Program reserves the right to reject any and all applications based on technical review or insufficient EPA funds.

SOLICITATION SCHEDULE

This solicitation for host sites will be conducted according to the following schedule:

Solicitation issue date:	October 30, 1998
Solicitation due date	January 6, 1999
Peer-review completed:	February 19, 1999
Compilation of review comments completed	March 1, 1999
Responses to accepted applicants	March 17, 1999

OUTLINE OF EVALUATION CRITERIA

The following is an outline of the evaluation criteria which the application should follow.

PART A (To be completed by all applicants)

- I. Site Factors
- II. Site Characterization Factors
- III. Regulatory Factors
- IV. Logistical Factors

Part B. Technology Factors

(To be completed by applicants who are proposing specific technologies for demonstration and Evaluation)

The following section discusses this outline in greater detail. Suggested page lengths for addressing each factor and relative weights are also listed. The weight factor is an indication of the importance of the selection factor.

PART A.

I. Site Factors (1-2 pages, 10% weight)

- A. Description of Site/Facility: site name, location, owner and operator.
- B. Site History: previous use of the site and the method or means of site contamination. Drawings showing the locations of contamination and infrastructure, photos showing history of contamination and infrastructure, and diagrams may be used as appropriate.

General Guidelines: Application should have a good description of site history and facility. It should be well written, clear, with relevant diagrams. There should be neither large gaps in information nor contradictory information that would lead the reviewers to question the applicant's basic knowledge of the site.

II. Site Characterization Factors (4-5 pages, 30% weight)

- 1. Contaminants or hazardous wastes present at the site
- 2. Levels of contamination present at the site
- 3. Contaminated medium or media
- 4. Current remediation or monitoring efforts underway
- 5. Site geology and hydrology

General Guidelines. Primary interest will be in well characterized sites that have contamination problems which are common yet difficult to treat. The contaminants should be of high priority. If there are other compounds present which will

interact with contaminants or cause analytical interference, then this should be noted and relative levels of the various compounds should be given. Vertical and horizontal extent of contamination should be known. Location of contamination including depth below the surface and depth to the water table should be given. Information on the permeability of the site's geologic formations is desired.

III. Regulatory Factors (2-4 pages, 30% weight)

1. Summary of Risk Assessment Findings
2. Clean up goals
3. Summary of Record of Decision (ROD) or of other remedial plan of action.
4. Summary of state and/or federal regulatory agency's involvement with site
5. Schedule for proposed remedial action

General Guidance. If a risk assessment has been performed, the results should indicate that site remediation is necessary. If clean up goals have been set, then these should be presented and should be realistic. Relevant ROD material should be presented. If applicant is proposing an action that is an alternative to a signed ROD or other agreed upon plan, then the rationale for the alternative(s) should be presented.

It is desirable that applicant have support of the appropriate regulatory agency in pursuing demonstration and implementation of innovative technologies. For example, a joint submission from both the site owner and the regulatory agency would be advantageous. If there is a remedial action schedule for the site, then the schedule be flexible enough to allow time to organize a SITE demonstration (Approximately 3 months is needed initially to plan the demonstration.)

IV. Logistical Factors (2-4 pages, 30% weight)

1. Site accessibility.
2. Infrastructure Support. (water, utilities, excavation services, test area, etc. for demonstration)
3. Ecological Factors.

General Guidance. The site must be accessible and be able to provide needed utilities for the demonstration. There should be space available to carry out the demonstration (space is needed for equipment, support area, etc.) It is desirable that applicant be able to provide or otherwise leverage logistical support for the demonstration. Aside from utilities and accessibility, logistical support also includes items such as excavation, demolition, disposal, and assistance in technology vendor's expenses. If logistical problems are foreseen, then applicant should be committed to resolving these issues. It is preferable that a technology demonstration will not have

any adverse effect on the ecology, e.g., endangered species, wetlands, other protected areas present. However, the presence of these ecological concerns may necessitate use of innovative technologies. If this is the case then the site may be of higher interest to the SITE program.

PART B. TECHNOLOGY FACTORS

If applicant is proposing specific technologies for demonstration, then this section should be completed. If a vendor is a candidate for a technology demonstration or remedial action at this site, the vendor should be identified and the technology briefly discussed. Applicant should cite the merits of the technology and should give clear evidence that the proposed technology is a potentially better alternative over conventional technologies. Application should include the following type of information.

1. Technology description
2. Advantages of technology over more conventional treatment
3. Scale of technology e.g., bench, pilot, full scale
4. Relevant performance data
5. Availability of the technology

The application will be evaluated based on the response to this requested information.

Section 3
Cover Page And Fact Sheet
HSA-003

The following pages are to be filled out
and placed on the front of the application.

Cover Page And Fact Sheet
HSA-003

APPLICATION NUMBER _____
(To Be Completed by EPA)

DATE SUBMITTED: _____

DATE RECEIVED: _____
(To Be Completed by EPA)

APPLICATION

TITLE: _____

SITE

NAME: _____

SITE OWNER

OR OPERATOR: _____

ADDRESS: _____

CONTACT PERSON: _____

ADDRESS: _____

PHONE NUMBER: (_____) _____ ext. FAX: (_____) _____
e-mail: _____

Part A. Priority area identified (check all that apply):

1. Groundwater containing:

- ☐ Contaminant plumes with both hazardous organic and inorganic compounds
- ☐ DNAPL, especially in fractured bedrock or karst environments
- ☐ PCBs or other chlorinated aromatics
- ☐ Creosote
- ☐ Phenols

2. Soils containing:

- ☐ Metals
- ☐ Pesticides
- ☐ Chlorinated Compounds
- ☐ Aromatics

☐ Creosote
☐ Phenols

3. Sediments containing:
☐ Pesticides
☐ Chlorinated Compounds
☐ Aromatics
☐ Metals

4. Other Areas:
☐ Containment-
 ☐ Alternative Caps
 ☐ Walls/Bottoms
 ☐ New Materials/Delivery Systems
☐ In-Situ-
 ☐ New Materials/Processes
 ☐ Evapotranspiration Covers

☐ Other _____

Part B.

Innovative Technology identified	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Specific vendor identified	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Attachment A Specific Activities

HSA-003

Introduction

The specific activities addressed below identify roles and responsibilities of the host site, the developer, and EPA. While individuals from different offices and groups within EPA may be involved in each demonstration project, The EPA SITE Program only assigns one person to manage each site, an EPA SITE Project Manager (PM). The developer(s) and the host site representative will have one point of contact (the PM). SITE also assigns a contractor to support the demonstration work efforts of the SITE project manager. This contractor assists with and/or conducts all aspects of the technology evaluation in cooperation with the EPA project manager, the developer(s), and the host site representative.

Interested parties that are willing to host a SITE demonstration will submit information to the Program. Sites will be prioritized based on the demonstration needs of the user community and the research focus areas identified in the solicitation. Final site selections will be made based on an EPA team review of each application. The submitted site information will be reviewed against a set of review criteria.

The SITE Program will provide the cost associated with technology evaluation plan preparation, field sampling, analysis and reports. Site hosts will be expected to provide infrastructure support to the project and residual waste disposal and costs. Technology vendors will be expected to provide their own resources to the demonstration (e.g. equipment, operation, maintenance) or form a financial relationship with the host site.

There is no contractual agreement between the SITE Program and the site and no funds will be given to the site as part of this agreement. Cooperative arrangements or Memoranda of Understanding between the SITE Program and the parties responsible for the host site will form the relationship between the SITE Program and the host site.

A typical SITE Demonstration schedule is as follows:

Weeks After Selection	Activity
0	Selection into the program
3 -4*	Site visit
8-12	Demonstration plan
12 - 52	Demonstration
16 - 36	Abbreviated summary is produced
20 - 52	Final report

* Site only applicants add 2 - 6 months for technology selection

EPA Responsibilities

This section outlines the responsibilities of EPA and other participants in the demonstration. The EPA SITE Program will work cooperatively with the developer, host site representatives, state and local agencies, and other participants involved in the planning and performance of the technology demonstration.

Initial Work Efforts

EPA will screen potential demonstration sites based on responses to this Host Site Application (HSA). EPA will conduct an on-site inspection of the host site and recommend any changes necessary prior to providing the final approval of the facility.

Once a technology is matched to a host site, EPA will arrange a kick-off meeting for the EPA regional Office, Other EPA representatives, host site representatives, the developer, and contractors.

EPA may provide assistance in addressing regulatory requirements for the developer and the host site.

EPA will assist the host site owner in locating appropriate potential technologies to remediate the site

EPA will work with the host site representatives and the technology vendor to determine a project schedule that is mutually acceptable and feasible for the demonstration.

Demonstration Plan

EPA SITE, with assistance from the developer and the host site representative, is responsible for the development of a demonstration plan. The basic design of the demonstration plan consists of four sections: an Operating Plan; a Sampling and Analysis Plan; a Health and Safety Plan; and a Quality Assurance/Quality Control (QA/QC) Plan. EPA intends to use its support contractors to provide information and coordination during the design and critical review of the demonstration plan. EPA will bear the cost of developing the plan, and EPA will provide internal review and final approval of the plan.

EPA will observe the operation of the tested system and will evaluate the project. The primary role of EPA will be to implement the demonstration plan.

1. SITE will write the Operational Plan with input from the site representative and the technology developer. The plan will describe the specific operation of the process and how the test will be performed.
2. SITE will be fully responsible for the sampling and analytical program, and will bear the associated cost. Other participants in the demonstration may propose a sampling and analytical system that would be scientifically adequate to evaluate the effectiveness and safety to human health and the environment. EPA will then negotiate a mutually acceptable sampling and analytical program. All sampling equipment and appropriate analytical facilities capable of sampling for and performing chemical, biological, and physical analyses, will be furnished by EPA. EPA will provide the site representative with the analytical results as soon as these become available.
3. The SITE Program, with input from the host site representative and the technology developer, will prepare a QA/QC plan that meets EPA's criteria. The QA/QC project plan, including the sampling and analysis portion of that plan, shall be approved by the EPA SITE PM and quality assurance officer as a part of an established procedure. EPA will write the final QA/QC plan for the demonstration.
4. EPA will obtain any health and safety plans from the host site. The health and safety plan will be incorporated into the demonstration plan for the technology selected for the

demonstration. EPA will bear the cost for planning, writing, and implementing the health and safety requirements for EPA contractor personnel engaged in sampling or other evaluation activities.

Field Demonstration

1. EPA will perform the sampling and analysis activities in accordance with the QA/QC and sampling and analysis plans.
2. EPA will implement the Health and Safety Plan, and provide a Health and Safety Officer.
3. EPA will implement a QA/QC field audit for sampling and analytical efforts.
4. Throughout the demonstration, EPA will record and document all activities, note any problems and solutions, and assist when necessary in solving problems.

Reports

The products of each demonstration project will generally be two EPA reports; a Technology Capsule and an Innovative Technology Evaluation Report. EPA will provide interpretation of all data acquired during the conduct of the demonstration and the host site representative will receive a review copy of the draft final project reports prepared by EPA. The draft reports will be peer reviewed by qualified scientific and engineering personnel.

HOST SITE RESPONSIBILITIES

The host site may provide assistance in selecting innovative technologies for a demonstration in 3 ways: 1) solicit general innovative technologies through a formal SITE solicitation, 2) propose one or more technology specific areas in the response to this Host Site Application (e.g., biological treatment, containment, extraction), or 3) propose a site need and suggested multiple vendors for demonstration in the response to this Host Site Application.

The developer is responsible for mobilizing equipment and personnel to the site, and preparing the technology for the demonstration, and associated costs. However, the host site may form a financial relationship with the technology vendor to cover all or part of the vendor costs for the technology demonstration.

Initial Work Efforts

1. Host site representatives will provide proof of all permits necessary to conduct a demonstration.
2. The host site representative will attend a kick-off meeting with EPA, EPA's contractor(s) and any other necessary individuals.
3. The host site is responsible for all logistical requirements for the demonstration. Specific logistical requirements might include, for example, availability of utilities, availability of certain types of test materials (e.g., contaminated liquids, soils), land area sufficient for setup, proximity to support facilities such as machine shops, elimination/minimization of geographical or geological restrictions, security provisions, and personnel safety provisions.
4. The host site will provide all necessary data related to the hydrogeology and other site conditions, results of feasibility studies, and results of waste analysis. The host site representative will specify any restrictions regarding the use of the site for the demonstration project and will negotiate with EPA a legal access agreement, or shall otherwise provide written confirmation of the acceptability of access to the site by EPA and/or contractors and consultants.
5. The host site representative shall participate in presenting information about the demonstration to the public through the Community Relations Activities.
6. The host site representative will supply informational materials for general EPA publications.

Site Preparation

EPA SITE, the host site representative, and the technology developer will develop the requirements for preparing the site for the technology demonstration. The host site will supply the support needs for carrying out a demonstration, such as bringing power and waste material to the process location, and providing adequate physical support for the process (paving, pad, or containment). Other site preparations may include excavation and hauling of soil, providing holding tanks for groundwater or slurries, and removal of large debris. The above items will be derived from a list of site preparation needs prepared by the developer after a final site selection is made. The cost for site preparation activities will be the responsibility of the

host site.

Demonstration Plan

1. The site representative will have the opportunity to provide input to development of an adequate sampling and analytical program for the technology. The program may include provisions for appropriate chemical analyses as well as bioassay as means for screening samples for detailed chemical constituents, toxicity, mutagenicity, carcinogenicity, and teratogenicity. The host site will then negotiate with EPA a mutually acceptable sampling and analytical program.
2. The host site representative will have input to EPA regarding elements of a Health and Safety Plan for the demonstration of the technology. The host site will ensure that steps are taken to protect their on- and off-site personnel from hazards resulting from the testing, and will consider the H&S Plan as one of the testing site requirements.

Treatability Studies

1. In some cases it may be necessary to conduct treatability studies on waste from the site prior to demonstration. Conduct of these tests, possibly at the Developer's facility, along with the operational cost, are the responsibility of the host site and/or the technology developer.
2. The EPA will assist the in designing treatability studies and producing operating and sampling plans.

Demonstration

1. The host site will advise EPA of any ongoing or impending situation relative to the execution of the test that will, or could, violate permitted operating conditions for the specific technology under test. This requirement applies regardless of whether EPA or the developer is the designated permittee.

Post-demonstration

1. The host site is responsible for demobilization or removal of any special site preparation materials (unless decided otherwise).

2. The host site will be responsible for handling any residual, by-products or debris material for disposal, treatment, or containment from a demonstration conducted at their facility.

Reports

1. The host site will allow EPA or EPA contractors to photograph the demonstration system during set-up, testing, and dismantling.
2. The host site will assist in preparation and review of the final project reports upon completion of testing.
3. The host site will provide comments on the draft Technology Capsule and Innovative Technology Evaluation Report.

The EPA SITE Program, the host site representative, and technology developer will cooperatively develop a schedule for the demonstration. This schedule will be based in part on the duration of the test that is necessary to accomplish the demonstration and evaluation of the technology. The overall project schedule will include estimates of time needed to prepare the host site for the demonstration.

The discussion of responsibilities has been confined to those tasks associated with the initiation and implementation of the demonstration program. Many events must occur in order for the program to evolve into a demonstration. A comprehensive list of activities will be discussed in greater detail when EPA meets with those host sites that are accepted or conditionally accepted into the SITE program.

EPA's acceptance of a site into the SITE Program is dependent in large part on statements made by in response to this HSA. If statements made in the application concerning key aspects of the project (e.g. availability of equipment, personnel, etc.) are determined to be incorrect after the site is accepted in to the SITE Program, EPA may reevaluate acceptance of the site.

APPLICATION-EXAMPLE
SITE NAME: Tar Waste Landfill, AAA Hydrocarbons, Inc.

Example Cover Page and Fact Sheet

HSA-003

APPLICATION NUMBER _____
(To Be Completed by EPA)

DATE SUBMITTED: XX-XX-XX

DATE RECEIVED: _____
(To Be Completed by EPA)

APPLICATION TITLE: Sample HSA Response

SITE NAME: Tar Waste Landfill
SITE OWNER AAA Hydrocarbons
OR OPERATOR:

ADDRESS: Rural Road
City, State, Zip

CONTACT PERSON: John Doe
Environmental Affairs

ADDRESS: Main St.
City, State, Zip

PHONE NUMBER: (111) 123-4567

INNOVATIVE TREATMENT TECHNOLOGY AND/OR VENDOR
CURRENTLY UNDER CONSIDERATION: In Situ Biological Wall
Innovative Technologies, Inc.

PRIORITY AREAS ADDRESSED IN THIS APPLICATION (CHECK ALL THAT APPLY):

X GROUNDWATER CONTAMINATED WITH
ORGANICS/INORGANICS

___ SOILS/SLUDGES/SEDIMENTS with (CHECK ALL THAT APPLY):
___ HEAVY METALS ___ RADIOACTIVE COMPONENTS
___ ORGANICS ___ OTHER ORGANICS

___ PETROLEUM COMBINED WITH OTHER COMPOUNDS

X RECALCITRANT ORGANICS W/LOW WATER SOLUBILITY (i.e.
PAHs FROM TOWN GAS SITES AND CREOSITE SITES), PCBs

AND PESTICIDES

— OTHER

— GROUNDWATER CONTAMINATED WITH
ORGANICS/INORGANICS

A. SITE FACTORS (2-3 pages, 20% weight)

1. Description of site or facility

AAA Hydrocarbons, Inc. (AAA), operates a chemical manufacturing facility just north of Bedford Falls, Wyoming, at a site covering about 2,200 acres. AAA owns a number of smaller parcels in the Bedford Falls area, one of which is identified as the Tar Waste Landfill (TWL). The TWL is located about 5 miles east of AAA's primary manufacturing facility in a mainly rural area. The TWL, which encompasses about 6 acres (measuring 475 feet by 550 feet) and grades slightly to the south, is covered mostly in short grasses with a few small trees towards its northwest corner. The entire site is surrounded by a chain-link fence, with an access road entering from the west. The surrounding area is predominantly flat with a few rolling hills to the north. The nearest surface water body is Elk Creek, located 1.5 miles west of the site. Elk Creek flows south and enters the Bison River about 3.5 miles from the TWL. Most of the land in the area is used for cattle grazing and farming, and the nearest residence is about 1 mile north of the site. A cluster of 15 residences is located about 3 miles south of the site.

2. Site History

The TWL property was purchased by AAA in 1970 to be used exclusively for landfilling wastes generated by production processes at the primary facility. In 1971, the north-central portion of the site was excavated over a 2-acre area from 4 to 8 feet below ground surface (bgs). AAA immediately began placing waste materials in the excavation and excavated other portions as necessary. According to AAA, wastes placed in the TWL were predominantly highly viscous coal tar fractions combined with sand and gravel, along with a moderate amount of construction debris. Waste materials were periodically covered with clay fines to prevent surface water discharges of wastes from the excavated areas. The TWL was periodically used by AAA

APPLICATION-EXAMPLE (continued)

until late 1974, and it is estimated that the site received over 2,500 cubic yards of waste materials. After ending waste deposition into the landfill, AAA covered the excavated areas with about 1 foot of compacted clay. No other operations or landfilling have occurred at the site since 1974.

In 1993, as part of State of Wyoming (State)-required investigations into former waste disposal sites, AAA installed a number of groundwater monitoring wells on and off site. Analytical results revealed organic contamination in the groundwater comprised mainly of polycyclic aromatic hydrocarbons (PAH). AAA has conducted further studies to characterize the groundwater conditions in the area and the extent of contamination. Negotiations are underway with the State to determine an appropriate groundwater cleanup methodology.

B. SITE CHARACTERIZATION FACTORS (2-3 pages, 25% weight)

1. Contaminants or hazardous wastes present at the site

The majority of the materials placed into the TWL by AAA were reportedly coal tar fractions. AAA hydrogenated coal tar under pressure to form various petroleum-like fuels and other compounds. It is believed that the fractions placed into the landfill were mainly (1) light oil, containing benzene, toluene, xylenes, cumenes, coumarone, and indene; and (2) heavy oil, containing naphthalene, acenaphthene, methylnaphthalenes, fluorene, phenol, cresols, pyridine, and picolines. Based on analytical data, contaminants from the coal tar fractions have apparently leached into the local groundwater.

2 and 3. Contaminated media and levels of contamination present at the site

Soil and groundwater contamination have been identified at the TWL, although a demonstration at the site would focus on groundwater remediation. The primary contaminants are benzene, acenaphthene, toluene, and phenol. Analysis of groundwater collected from three on-site monitoring wells located downgradient of the former fill areas has revealed contamination down to 35 feet bgs in the following concentrations: benzene

APPLICATION-EXAMPLE (continued)

ranging from 2 milligrams per liter (mg/L) to 7 mg/L; acenaphthene ranging from 4 mg/L to 10 mg/L; toluene ranging from 1.7 mg/L to 12 mg/L; and phenol from 17 to 25 mg/L. Benzene and phenol are the only contaminants that have been detected in off-site monitoring wells, which are located about 50 feet from the southern border of the TWL. Benzene has been detected at concentrations ranging from 0.003 mg/L to 0.02 mg/L, and phenol has been detected at concentrations ranging from 0.40 mg/L to 3.4 mg/L.

4. Current remediation or monitoring efforts being conducted

No remediation has been performed at the site, although AAA has installed a number of groundwater monitoring wells on and off site. The clay layer placed on the surface of the landfill after waste disposal ended displays signs of erosion from heavy rains and cracks from dry periods, although no waste material is exposed.

5. Site geology and hydrogeology

The TWL is located in a former alluvial sedimentation basin. The site is underlain to about 1.5 feet bgs by topsoil and loess, followed by interbedded sand, silty sand, and gravel (upper sand layer) to about 35 feet. This material overlies a tight clay layer (clay layer) extending to about 130 feet bgs. A sand and gravel layer (gravel layer) with thin, interbedded clay seams lies below the clay layer and extends to about 350 feet bgs. Based on soil borings performed at the site for the installation of the monitoring wells, along with a review of area well logs, all of the formations underlying the site are believed to be continuous over a fairly large portion of the surrounding region. Boring logs for wells installed at three farms located about 2.5 miles from the site show the tight clay layer as thinning to about 15 feet, with the upper sand layer extending to about 95 feet bgs.

The upper aquifer in the TWL area is the upper sand layer. The water table in the area is present at about 20 feet bgs and groundwater flows towards the south and the Bison River. AAA has determined that the hydraulic conductivity of the sand layer ranges from 10^{-3} to 10^{-4}

APPLICATION-EXAMPLE (continued)

centimeters per second. The nearest drinking water well is located 1 mile north of the site and is screened at about 450 feet bgs in the sand and gravel layer. The nearest downgradient drinking water well, which is at one of the farms 2.5 miles south of the site, is screened in the lower sand and gravel layer at about 400 feet bgs. On the adjacent property, a groundwater well screened in the upper sand layer at about 70 feet bgs is used to supply drinking water to farm animals. Drinking water for the residential area located 3 miles south of the site is supplied by a combination of two groundwater wells screened at 450 feet in the gravel layer, with the Bison River serving as a backup source.

C. REGULATORY FACTORS (2-3 pages, 20% weight)

1. Risk Assessment

In 1995, AAA performed a risk assessment for the TWL area to determine if contamination from the landfill may have a negative impact on the surrounding human population or ecological areas. The risk assessment concluded that contamination detected in groundwater from the upper aquifer south of the site could present a risk to humans when used for agriculture, and farm animals when used for drinking water. Calculations were derived from the hydraulic conductivity of the upper aquifer, combined with contaminant concentrations and distance. The risk assessment stated that it is possible that natural attenuation could degrade contamination in the groundwater to concentrations below risk-based contaminant levels specified for humans.

2. Permits currently held by the site and permits that may be needed before hosting a demonstration

No permits are currently held by AAA for the TWL and the only permit that may be necessary would be for on-site storage of excavated soil. The State has informed AAA that a full RCRA permit would not be necessary for soil storage on the site.

3. Proposed cleanup levels or goals

The State and local regulatory agencies have performed an assessment of regional groundwater use and the probability of its use in the future. These agencies

APPLICATION-EXAMPLE (continued)

consider the upper and lower aquifers of the area Class I aquifers suitable for domestic use. No domestic wells are screened in the shallow aquifer within at least 4 miles of the site. For groundwater contamination at the TWL, AAA and the State have agreed on groundwater cleanup levels provided in the *Wyoming Water Quality Rules and Regulations*, Chapter XVII, Sections IX, Appendix X, and Appendix A. The following list displays Wyoming groundwater cleanup levels for the primary contaminants in groundwater at the TWL:

Benzene:	0.005 mg/L
Acenaphthene:	1.9 mg/L
Toluene:	1.0 mg/L
Phenol:	19.0 mg/L

These concentrations are at or below federal maximum contaminant levels (MCL) for groundwater. Wyoming's regulations include the protection of water in the vadose zone, which will require consideration at the TWL.

4. Records of decision or proposed remedial actions currently being considered for the site

AAA is required under Wyoming Statute Title 35, Chapter 11, Article 3 to remediate groundwater contamination depending on the current or potential use of the aquifer. Eventual remediation of the source area will be required, which is under negotiation with the State. Because the shallow aquifer in the TWL area is classified as a Class I aquifer, the cleanup levels listed in Part 3 above must be followed. AAA and the State have signed an agreement for the remediation of contamination in the shallow aquifer through the use of an innovative treatment technology referred to as an in situ biological wall (IBW). A pump-and-treatment system was discussed for remediating groundwater contamination at the TWL; however, the State prefers to avoid a groundwater-to-surface water discharge, and the logistics of installing an on-site wastewater treatment system make it an impractical option. The State has agreed to allow placement of the IBW along the southern border of the site, even though organic contaminants have been identified in off-site monitoring wells. The owner of the land immediately south of the AAA property will not allow installation of the IBW on his property. The State believes that if the wall is installed along the south border of the TWL and contaminant migration

APPLICATION-EXAMPLE (continued)

from the property is halted, natural attenuation will reduce the concentrations of contaminants that have already migrated from the site to below regulatory levels.

D. LOGISTICAL FACTORS (2-3 pages, 25% weight)

1. Site accessibility

The TWL is easily accessible from State Route 30, which is about 2 miles west of the site. A gate wide enough to allow the passage of a semi-trailer is located on the west side of the site, and because the site is predominantly flat, movement throughout would not be limited. There are no paved roads on the site property and during heavy rains the site can become muddy. However, because of the underlying sand, the site tends to drain quickly.

2. Infrastructure support (such as utilities and water) for the demonstration

Installation of the IBW will require no permanent utility hookups or water supplies. A portable electric generator can be used at the site and initial process water can be supplied by tanker trucks. AAA will be responsible for the contracting requirements and costs associated with temporary utilities.

3. Approximate location of equipment set up

The IBW will be installed along a 300-foot portion of the south border of the site. Groundwater monitoring has indicated a wall of this size will intercept the contaminant plume migrating from the source area on site. AAA will rent a utility trailer during the installation phase of the demonstration, which will be used as a general meeting area and for storage of small equipment. The trailer will be removed after installation, although a storage shed will be constructed by AAA at the site to house sampling equipment and health and safety gear for future sampling events. A cellular telephone will be rented by AAA when the IBW is installed, and also during future sampling events.

APPLICATION-EXAMPLE (continued)

4. Quantity and location of waste to be processed

AAA estimates that about 1,555 cubic yards (yd³) of soil will be excavated in stages for the placement of the IBW. About 1,300 yd³ of the excavated soil will be staged adjacent to the trench, mixed with gravel and the proprietary compound, and then placed back into the trench. Excess soil (about 255 yd³) will be analyzed and placed in a storage area to be erected at the north end of the site, and eventually added to the on-site source materials.

5. Ecological factors (such as endangered species, wetlands, or other protected areas)

No endangered species, wetlands, or other protected areas have been identified that could affect remediation considerations for the TWL. The driving remediation factor at the site is the prevention of off-site migration of contaminated groundwater. To prevent the overland migration of contaminated soil from rain storms, AAA will erect a temporary berm composed of straw bails, plastic sheeting, and a collection area along the south border of the site. Collected storm water will be analyzed and handled appropriately by AAA depending on contaminant concentrations.

E. TECHNOLOGY FACTORS (less than 5 pages, 10% weight)

1. Listing and assessment of innovative technologies that merit consideration for remediation of site

AAA has worked closely with the State to identify potential groundwater remediation measures for the TWL. Because of the remote location of the site, the types of technologies that could be implemented at the site are limited to those that do not require long-term utility connections. A feasibility study to determine applicable remediation technologies was performed for the TWL in 1996. After a number of discussions with regulatory agencies, AAA selected the IBW developed by New Methods, Inc. (NMI).

The IBW degrades organic contamination through enhanced biological activity. NMI has developed a proprietary compound that causes the long-term enhancement of biological activity, which has shown to be especially effective in reducing contaminant

APPLICATION-EXAMPLE (continued)

concentrations of PAHs. The exact reasons for the proprietary compound's enhancement of the biological activity is not clearly understood, although NMI theorizes that the compound serves as a type of "super nutrient" for the bacteria. What makes the IBW developed by NMI innovative is that the proprietary compound contains oxygen, which is adsorbed by the bacteria, and that an IBW requires little maintenance after installation. An occasional "compound boost," composed of thinned proprietary compound, is injected into the IBW through 2-inch-diameter wells. The amount and the timing of the compound injection depends on various factors, including wall depth and groundwater contaminants. Because the hydraulic conductivity of the IBW will be greater than that of the surrounding formation, the injected compound will tend to migrate throughout the wall rather than into the surrounding formation.

In early 1997, NMI conducted a pilot-scale demonstration of the IBW at the TWL to determine the technology's effectiveness at reducing concentrations of PAHs in groundwater. The pilot-scale test generally involved constructing a box containing an IBW measuring 4-feet by 4 feet with a thickness of 2 feet. Composited source material from the TWL was placed on the upgradient portion of the IBW, while clean sandy soil was placed on the downgradient portion. A separate leach test was performed on the source material to determine baseline contaminant concentrations. Purified water was allowed to seep into the source material and then permeate through the IBW. Samples were taken from the clean soil and analyzed. Concentrations of contaminants were below required regulatory levels for the TWL. After determining the feasibility of using an IBW at the TWL, especially to a depth of about 35 feet, AAA elected to install a full-scale IBW.

A trench for the wall will be excavated about 15 feet north of the fence at the south border to allow the free movement of a track-hoe. The trench will be excavated to just into the tight clay layer to about 36 feet bgs and will measure about 4 feet in width. Soil will be excavated in 20-foot segments and a slurry mixture will be added to the trench to keep it open while the excavated soil is mixed with

the gravel and proprietary compound. The slurry mixture to be used will not permanently coat the trench walls. As a second 20-foot section of trench is excavated, the soil/compound mixture will be added to the trench. This methodology will be continued for the proposed length of the trench. After a 2-week period, 2-inch-diameter wells will be installed into the trench every 30 feet. NMI estimates that a compound boost will be necessary at the TWL about once per 6 months. AAA will be responsible for the cost of excavation, injection well installation, and future compound boosts. AAA would like the U.S. Environmental Protection Agency to pay for the costs of groundwater analysis for the first 6 months after the IBW is installed and perform data analysis on the performance of the IBW.